Waste at INEEL

Flooding at Radioactive Waste Management Complex in 1962. This and other flood events helped drive contamination to the aquifer beneath the site. Cleanup of buried wastes at the RWMC and other locations on the INEEL is a top priority for the state.

Publicity photo issued by INEEL in 1984. A waste treatment facility called the calciner and before-and-after comparison of waste treated there. Facilities such as the calciner which were "grandfathered" when air-quality laws were passed pose a problem for state regulators.

Footings for INTEC tank farm, 1951. Liquid high-level waste is stored in these tanks. Getting liquid waste out of these tanks is a top priority for the state.

Waste handling practices of the past are coming into focus today. They guide our management, treatment, and disposal actions, and could have ramifications for hundreds—perhaps even thousands—of years.

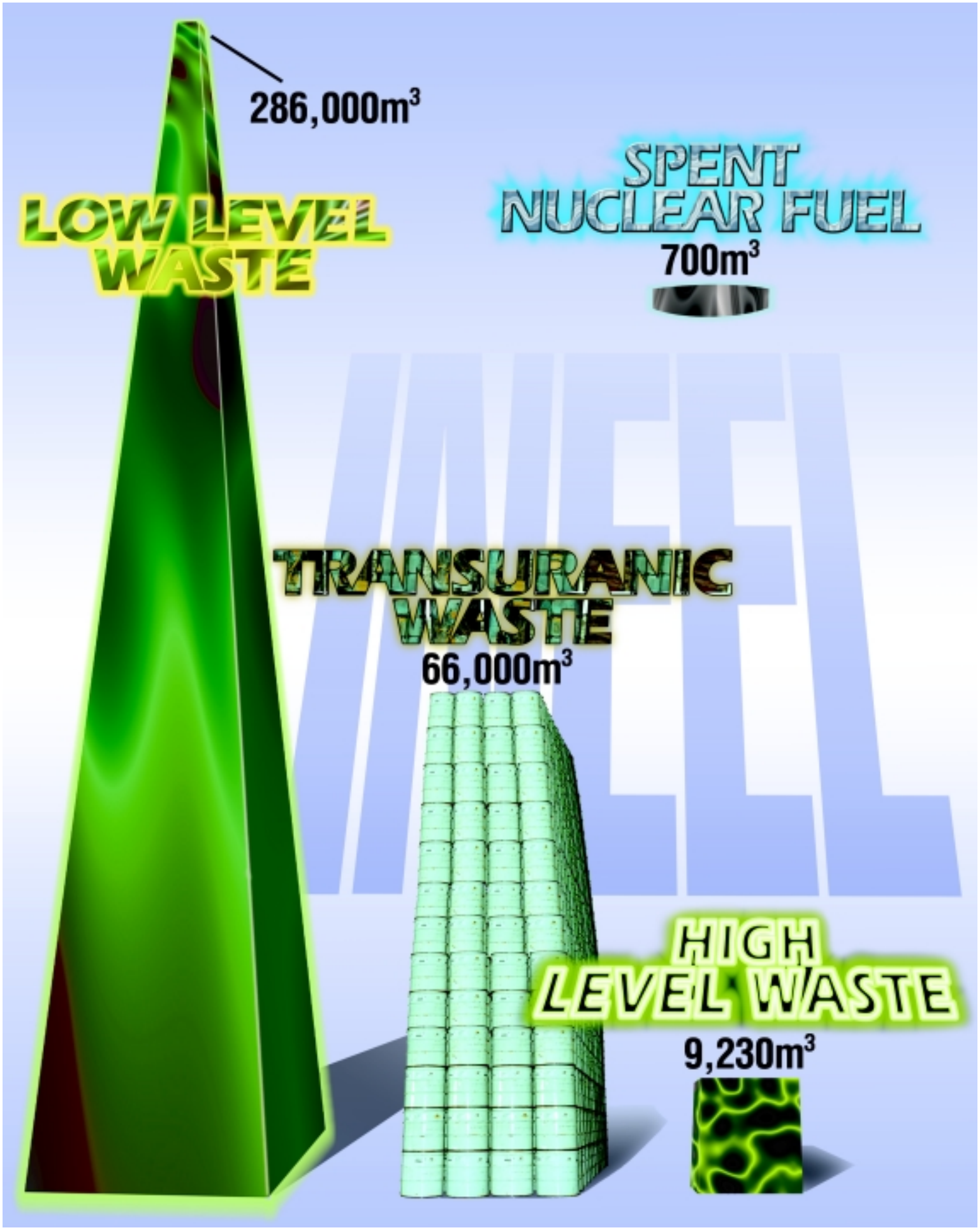
During the past 51 years, the INEEL created nuclear waste as part of ongoing operations. The federal government also sent nuclear waste from other sites to the INEEL for temporary storage. With the passage of time, some waste storage containers and facilities need replacement. While some of the waste at the INEEL is neatly packaged, other waste is in the form of contaminated soil and groundwater from spills, leaks, facility emissions or poor historic waste disposal practices.

In 1991, DOE, U.S. EPA and the State of Idaho agreed upon a Superfund-style cleanup process for addressing chemically and radioactively contaminated areas around the INEEL.

But the question of how DOE would meet promises to Idaho officials to remove other waste types remained. In 1995, decades of legal and political wrangling between the state and federal government resulted in a Settlement Agreement. The Agreement set out steps for handling spent nuclear fuel, transuranic waste and high-level waste. For spent nuclear fuel, there are steps for safer storage and removal from Idaho. For high-level waste, there are steps for treatment and for the waste being "road ready." For transuranic waste, steps address treatment and removal.

The Settlement Agreement, however, did not establish specific steps for low-level waste. That's because negotiators faced time constraints. All of the parties involved in the negotiations wanted to reach agreement before a court-ordered deadline, after which a federal judge would make decisions that could be bad for either or both sides. State negotiators took a "worst-first" approach, addressing the wastes they felt posed the most risks. To hold DOE to a schedule for spent nuclear fuel, high-level waste and transuranic waste, the State accepted that it would have to address the management of INEEL low-level waste through other means.

Upcoming decisions about waste treatment and disposal should bring further clarity to the waste management picture. In the next few years, DOE plans to determine whether a site at Yucca Mountain, Nevada is suitable as a repository for spent nuclear fuel and high-level waste. The decision about the repository and the restrictions on the waste it accepts will affect how waste at the INEEL waste is stored and treated. In 2001, DOE should make a decision about how it will treat the INEEL's high-level liquid waste and calcine.


286,000m³
LOW LEVEL WASTE
SPENT NUCLEAR FUEL
700m³
TRANSURANIC WASTE
66,000m³
HIGH LEVEL WASTE
9,230m³

Some types of low-level waste will remain at the INEEL, although DOE plans to stop all on-site waste disposal by 2008.

Difficult questions must be answered about what to do with large quantities of waste, mostly contaminated soil and groundwater, under the Superfund cleanup program. How and where should this waste be disposed of? What level of risk are we willing to accept in Idaho and other places? How much are we willing to pay to reduce risks by treating them or shipping them somewhere else? How much are we willing to pay to develop ways to address waste we may not be able to address with current technology?

Comparing wastes, assessing risks

INEEL has over four times more low-level waste than spent nuclear fuel, high-level waste, and transuranic waste combined. But the volume of the waste tells only part of the story.

Risks presented by wastes also depend on the type and amount of radioactive material they contain. Some waste is very radioactive in the short term, but loses its radioactivity in the long-term. Other waste is radioactive for a long time.

Different types of radiation also pose different types of risks. For example, alpha radiation is in the form of larger particles that can be stopped by a piece of paper, but pose health risks if they are inhaled or ingested. Differences among waste types affect how we safely treat, store and dispose of them.

Key points to remember

- There is a lot of nuclear waste, but there aren't many waste types. It falls into only 4 categories: high-level waste, spent nuclear fuel, transuranic waste, and low-level waste. Each has different characteristics; can be treated, handled, and disposed of in different ways; is subject to different agreements; and falls under different regulatory authorities.
- DOE regulates itself for wastes that are radioactive. The state has little regulatory control over waste that is radioactive but not hazardous. However, if a radioactive waste is also hazardous, it is a "mixed waste." There are laws and regulations, enforced by the U.S. EPA and the Idaho Department of Environmental Quality, for hazardous waste. EPA and DEQ regulate the hazardous part of mixed waste.
- Two waste types are named according to how they are made. Spent nuclear fuel is made in a nuclear reactor, when fuel is unable to sustain the reaction that makes the reactor run. High-level waste was made when spent nuclear fuel was reprocessed to recover usable uranium. Reprocessing at INEEL involved dissolving the waste in acid, so the resulting waste was a very acidic liquid.
- Transuranic waste is identified by the contaminants, transuranic elements, it contains. For the most part, these elements are man-made, although they do occur naturally. Transuranic waste is further defined by concentration of contaminants. If the waste has more than 100 nanocuries per gram it is a transuranic waste, but if it has less it is a low-level waste.
- If a waste does not fit into one of the three categories described above, it is a low-level waste. This waste category could be described as "all other wastes." It's difficult to make generalizations about low-level waste. It might be contaminated with a low-activity or high-activity isotope; a long-lived isotope or one that decays quickly.
- Spent nuclear fuel is being moved from wet to dry storage and prepared for eventual shipment out of Idaho. There is no repository open to accept it.
- Sometime in 2001, DOE and the State will complete a final environmental impact statement evaluating options for treatment and disposal of high-level waste and disposition of the facilities used to treat and store that waste. These decisions may involve shipping waste elsewhere for treatment or building a new waste treatment facility at INEEL.
- Transuranic waste is being shipped out of Idaho, but the state is concerned about DOE's ability to meet a Settlement Agreement milestone to ship 15,000 barrels of waste out of Idaho by the end of 2002.

Tanks for the memories

Tank construction. Above, 1954. Below, 1951.

The INTEC Tank Farm isn't your typical farm. From the surface, there's not much to see. It consists of 11 underground tanks that can each hold 300,000 gallons. Each tank is about 50 feet in diameter. The tanks were built from 1950 to 1964. They don't meet today's standards for hazardous waste storage. These tanks also rest a few hundred feet over the Snake River Plain Aquifer. Getting liquids out of the tank farm is a top priority for state officials.

The 1995 Settlement Agreement sets deadlines for solidifying liquid waste in the Tank Farm, while a consent order between DOE and state and federal regulators sets requirements for shutting down the Tank Farm.

The Tank Farm poses a problem from a waste management perspective. When the plumbing went in at INTEC, the federal government probably didn't give much thought to its effect on long-term waste management. So instead of segregating waste according to how it should be treated and disposed, the plumbing system mixes different types of waste together.

Until 1992, the INEEL dissolved spent fuel in nitric acid to recover uranium. The Tank Farm's main purpose was to store the acidic, high-level radioactive liquid wastes this process created until they could be calcined. Although the INEEL stopped spent fuel reprocessing in 1992, the Tank Farm continues to receive liquid waste from other INTEC operations.

Today, most hazardous, radioactive liquid waste at INTEC ends up in the Tank Farm. Because the waste is mixed together, for now DOE must manage all Tank Farm waste as if it were high-level waste from reprocessing. Because treating and disposing of high-level waste is technically challenging and very expensive, that's an incentive for DOE to change how it manages liquid waste.

There are 3 types of tank vaults, none of which meet regulatory standards. The state is most concerned with the 5 tanks assembled from precast concrete in the early 1950s, called "pillar and panel" tanks. They have 1 leak detection sump and are the most vulnerable in case of earthquakes. A DEQ-EPA consent order requires DOE to be out of these tanks by 2003. DOE must also submit to DEQ closure plans for 2 of these tanks by the end of 2000.

The concrete for the two other types of vaults was poured in place. There are 4 tanks with square vaults and 2 tanks with octagonal vaults. All of these vaults have 2 leak detection sumps. The transfer lines for the octagonal vaults are a problem, so DEQ will not allow DOE to send any more liquid to these tanks. DOE must be out of all of the tanks by 2012.

DOE plans to stop sending liquids to the Tank Farm by 2005 and use new tanks for liquids generated from ongoing operations. And DOE is taking steps to reduce the amount of liquids it generates; it's even created a special monetary incentive for the INEEL contractor to minimize liquid waste creation. Running liquid waste through an evaporation system also reduces waste volume.

Tank "heels" pose another problem. Coils in the bottom of tanks and the tanks' pumping systems make it difficult to remove all liquids from the tanks. Solids can also collect at the bottom. So a "heel"—roughly 10,000 gallons—remains. The most likely way to deal with the heels is to jet more water into the tank and continue pumping to remove as many of the radioactive and hazardous constituents as possible.

The tanks aren't likely to be removed. DOE has proposed several options for sealing them with grout. DOE must submit plans for closing the tanks to DEQ for approval. The plans must meet hazardous waste regulations, and DEQ must give the public an opportunity to comment before a decision is made.

The options for treating tank liquids and tank closure are discussed in more detail in the Environmental Impact Statement for INEEL high-level waste management described on the preceding pages of this report.